

Notice of Allowability

Application No.

10/039,587

Examiner

Mujtaba K. Chaudry

Applicant(s)

TU ET AL.

Art Unit

2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/6/2005.
2. ☒ The allowed claim(s) is/are 1-20.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

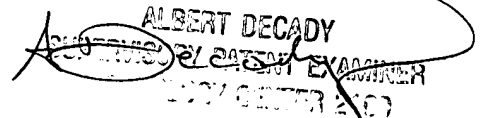
1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 2/28/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

 12/9/05

U.S. Patent and Trademark Office
PTOL-37 (Rev. 7-05)

Notice of Allowability

Part of Paper No./Mail Date 20051209


ALBERT DECADY
EXAMINER
2133 CENTER 2107

REASONS FOR ALLOWANCE

Claims 1-20 are allowed. The following is an Examiner's statement of reasons for allowance:

Independent claim 1 of the present application teaches a apparatus comprising a first and second executions cores to operate in a FRC mode; an FRC check unit to compare the results from the first and second execution cores and to store at least one result and a status to indicate if the result matches; an error check unit to assert a signal to the FRC checker if a recoverable error is detected in the first or second execution cores; and a timer to trigger an FRC recovery routine if the status indicates the results do not match and the error check unit asserts the signal within a specified interval. All of foregoing limitations are not found in the prior arts of record. The prior art of record, namely Grochowski, teaches a processor is provided having dual execution cores that may be switched between high reliability and high performance execution modes dynamically, according to the type of code segment to be executed. When the processor is in high performance mode, the dual execution cores operate in lock step on identical instructions, and the execution results generated by each execution core are compared to detect any errors. Grochowski also teaches implementing parity protection in conjunction with dual execution cores 110 is that the correct execution result may be determined without need to reexecute the instructions. For example, if check unit 130 detects a discrepancy between the execution results (by comparing their values or their parity bits), it can compare the calculated parities for the results against their corresponding parity bits to determine which result is correct. The execution core 110 providing the correct result may then update the processor's state and make any corrections necessary to the C/S or data registers of the execution core that produced the error. In another embodiment, the check unit 130 may trigger an interrupt that implements an error

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handling routine in firmware or software. For this embodiment, processor 100 may access an error handling routine when check unit 130 signals an error. One embodiment of a firmware recovery mechanism operates in conjunction with parity protected register files and/or staging latches in execution cores 110. When an error is detected, a firmware routine reads parity bits associated with the registers and/or latches to determine where the error lies. The register files and/or latches of the execution core that produces the error may be updated with data from the execution core that does not display any parity errors. None of the prior arts of record teach nor fairly suggest all the limitations in the independent claim 1 of the present application. In particular, the limitations of "...a timer to trigger an FRC recovery routine if the status indicates the results do not match and the error check unit asserts the signal within a specified interval" are not taught nor fairly suggested in the prior arts of record.

Independent claims 9 and 17 include similar limitations of independent claim 1 and therefore are allowed for similar reasons.

Dependent claims 2-8, 10-16 and 19-20 depend from independent claims 1, 9 and 17 and inherently include limitations therein and therefore are allowed as well.

Any inquiries concerning this communication should be directed to the examiner, Mujtaba Chaudry who may be reached at 571-272-3817. The examiner may normally be reached Mon – Thur 6:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, please contact the examiner's supervisor, Albert DeCady at 571-272-3819.


Mujtaba Chaudry
Art Unit 2133
December 9, 2005

ALBERT DECADY
PATENT EXAMINER
